

SCHOOL OF DIPLOMA STUDIES	PROGRAM: DIPLOMA – ELECTRICAL ENGINEERING	
ACADEMIC YEAR - 2018-19	SEMESTER – III	BATCH YEAR: 2017-20
DEFINITION OF ONE CREDIT: 1. Lecture(L): 1 hour / week / semester, 2. Practical(P): 2 hour / week / semester 3. Tutorial(T): 2 hour / week / semester		

Course Code	Course Name	Teaching Hours			Credits	Audit course	CIE	PSEE
		Theory	Tutorial	Practical				
DEE305	ELECTRICAL MACHINE-1	3	0	4	5	N	Y	Y
DME205	BASIC ENGINEERING DRAWING	2	0	4	4	N	Y	Y
DEC316	ELECTRONICS MEASUREMENT AND MEASURING INSTRUMENTS	3	0	2	4	N	Y	Y
DEC206	ELECTRONICS WORKSHOP	0	0	2	1	N	Y	Y
DEC315	ADVANCE ELECTRONICS	3	0	2	4	N	Y	Y
DEE410	ELECTRICAL POWER SYSTEM-1	3	0	2	4	N	Y	Y
	Total	14	0	16	22			
		Total Hours			30			

Students are required to undergo 15 hours training / field visit/ workshop in relevant field during semester.

N- No	CIE – Continuous internal evaluation
Y – Yes	PSEE – Practical semester end examination including ITD, Dissertation, Industrial project, Industrial training etc...

Course Title	ELECTRICAL MACHINE-1
Course Code	DEE305
Course Credit	Lecture : 3
	Practical : 1
	Tutorial : 0
	Total : 4

Course Learning Outcomes

At the end of course, students will be able to:

- **Differentiate** between singly and doubly excited electrical machines
- **Describe** function of different parts of DC machine with sketches.
- **Solve** numerical on various tests of single phase transformers
- **Perform** OC and SC tests of single phase transformer
- **Perform** sumpner test on single phase Transformer
- **Calibrate** losses and efficiency of DC generator

Detailed Syllabus

SECTION I		
Module No.	Topics	No. of Sessions
1	ENERGY CONVERSION PRINCIPLES <ul style="list-style-type: none"> • Law of conservation of energy, Role of electrical energy and uses, Electro-mechanical energy conversion principles, Condition of production of e.m.f., Rotoraction, Unifiedtheory, Singly excited and doubly excited field system 	7
2	D.C. GENERATOR <ul style="list-style-type: none"> • Principle of working, Construction ofGenerator, Materials used for different parts, Types of Generator, Difference between Simple lap and wave winding, Armaturereaction, Commutation, Performance characteristic of different types of Generator, Losses& Efficiency 	7
3	D.C. MOTOR <ul style="list-style-type: none"> • Principle of working,Construction ofMotor, Backe.m.f., Voltage and torque equation, Performance characteristics of D.C. motor, Speed 	7

control of D.C. motor, including electronic control, Losses&efficiency,
Applications of D.C. motors

SECTION II

4	SINGLE PHASE TRANSFORMER <ul style="list-style-type: none"> Principle of working, Construction and types, Materials used in different parts of transformer,E.M.F. equation and transformation ratio, No load and on load vector diagrams, Voltage drop in transformer, Equivalentcircuit ,O.C. & S.C. test ,Sumpner test ,Regulation of transformer ,Losses & efficiency ,Parallel operation ,Auto transformer 	10
5	POLY PHASE TRANSFORMER <ul style="list-style-type: none"> Construction and types of connection of 3-phase transformer, Comparison of a bank of 3 No. single phase transformer and three phase transformer, Parallel operation of 3-phase transformer, Accessories of transformerCooling of transformer 	5
6	PUMPS AND PUMPING SYSTEM <ul style="list-style-type: none"> Construction, Working principle, Types of pumps Performanceevaluation,Pump curve, Pump Efficiency and Efficient system operation, Flow control strategies,Application ,Energy conservation opportunities 	6

Reference Books:

1. A text book of Electrical Technology Vol.I and II By B.L. Theraja ,S.Chand publication
2. A text book of theory of Electrical machine by J.B .GUPTA , Khana publication
3. Principles of Electrical Machine by V.K.MehtaS.Chand publication

List of Experiments:

Reference Books:

1. A text book of Electrical Technology Vol.I and II By B.L. Theraja ,S.Chand publication
2. A text book of theory of Electrical machine by J.B .GUPTA , Khana publication
3. Principles of Electrical Machine by V.K.MehtaS.Chand publication

List of Experiments:

- (1) Demonstration of D.C. Machine parts
- (2) To performance of the characteristics DC Series Generator
- (3) To perform speed control on DC Shunt Motor
- (4) Obtain the efficiency of DC Shunt Motor by Swinburne's test
- (5) To verify the operating characteristics of DC Series Motor
- (6) To perform transformation ratio of Transformer
- (7) To Perform Polarity test of transformer
- (8) To perform O.C. & S.C. test on Transformer
- (9) To perform load test on single phase Transformer.
- (10)To perform Parallel operation of single phase transformer
- (11)To perform sumpner test on single phase Transformer
- (12)To study the Transformer accessories and cooling method
- (13)To study about different type of pump

Course Title	ELECTRONICS WORKSHOP
Course Code	DEC206
Course Credit	Lecture : 0
	Practical : 1
	Tutorial : 0
	Total : 1

Course Learning Outcomes

At the completion of the course, students should be able to:

- **Understand** different soldering and de-soldering materials and **use & practice** soldering and de-soldering materials.
- **Understand** types of various cables and connectors and **summarize** those types.
- **Demonstration** and **Identification** of various electronic components
- **Understand** the use of breadboard and **practice** and **prepare** simple electronics circuits on breadboard.
- **Practice** of various projects and **demonstration** of it on PCB.

Detailed Syllabus

Module No.	Topics	No. of Sessions
1	Soldering practice Types of Soldering Iron, Study soldering material ,SMD soldering and tools ,Liquid flux ,Use of thinner to clean soldering contacts ,Soldering practice ,De-Soldering practice ,Precaution during soldering ,Precaution during de-soldering ,Good soldering & bad soldering ,Difficulties of dry soldering ,Zero defect soldering	8
2	Types of cables & connectors Shielded wires, Coaxial cables ,Twisted pair ,Flat ribbon cable ,Teflon coated wires , Different types of Fiber cables, Make chart for various component & cables	5

3	<p>3.1 Resister Carbon composition Resister ,Carbon film resister ,Metal film resister Wire wound, Fusible resister ,1/8w, 1/4w, 1/2w, 1w,2w,5w ,Fixed& Variable Potentiometer , Preset, Multi turn, Trim post wire wound, Sliders, Color codes</p> <p>3.2 Inductor Wire indicator - Air core ,Ferrite core , Axial lead inductor</p> <p>3.3 Capacitor Electrolytic, Ceramic, Polyester, Metalized polyester, Tetantalum, mica, Ceramic, Paper capacitor, Gang capacitor- trimmer capacitors</p> <p>3.4 Semi conductor component Diode, Transistor, LED</p>	6
4	<p>Bread board Characteristic of bread board Bread board practice ,Series& parallel connection of Resister on bread board</p>	3
5	<p>Hands on Experiments Design simple circuit on bread board ,Design simple circuits on General purpose PCB ,Make one chart for electronics component</p>	6

Text Books

1.Electronic Practice by S. K. Shahdev, DHANPAT RAI PUBLICATION

Reference Books:

- 1.Electronic Components and MaterialsbyDhirS.M.,TATA MCGRAW HILLS PUBLICATION
2. Electronic Components Handbook by Thomas H.Jones, RESTON PUBLISHING

List of Experiments:

1. To **understand** use of soldering Iron & various soldering Material.
2. To **demonstrate** and **practice** Soldering & De-soldering of Basic Components.
3. To **identify** different types of cables & Connectors for Various Circuits.
4. To **apply** different types of resistors Testing & Color Codes.
5. To **understand** different types of Inductors.
6. To **understand** different types of Capacitors.
7. To **analyze** the characteristics of various Diodes.
8. To **analyze** the characteristics of various Transistors.
9. To **understand** Bread board Test for Various Circuits.
10. To **practice** series & Parallel Connections of Resistors on Bread board.
11. To **practice** various Simple Circuit Using Basic Components on Bread board.
12. To **practice** Simple circuit on General Purpose PCB Using Basic Components.

Course Title	ELECTRONICS MEASUREMENTS & MEASURING INSTRUMENTS
Course Code	DEC316
Course Credit	Lecture : 3
	Practical : 1
	Tutorial : 0
	Total : 4

Course Learning Outcomes

At the completion of the course, students should be able to:

- **Explain** the basic concepts of measurement & **distinguish** the terminologies related to measurement and **calculate** the error in measurements.
- **Realize** and **demonstrate** that how different bridge networks are constructed and balanced for finding out values of resistance, capacitance and inductance.
- **Understand** the basic operation of oscilloscope and its internal structures, different component testers.
- **Understand** the internal structure of all instruments that are used to measure the parameters related to electronics and **differentiate** the analog and digital meters and their performance characteristics.
- **Understand** basics of transducers and their working principles **categorize** and **choose** appropriate transducer for specified application.

Detailed Syllabus

Module No.	Topics	No. of Sessions
SECTION-I		
1	INTRODUCTION Necessities of measurements, Definitions: accuracy, precision, resolution, error, sensitivity, Types of errors, Limiting of errors.	3
2	BRIDGES Wheatstone bridge, Limitations & application of Wheatstone bridge Sensitivity of Wheatstone bridge, Kelvin's double arm bridge, Unbalance conditions, Maxwell's bridge, Hay bridge, Schering bridge, Wien's bridge.	9

3	<p>OSCILLOSCOPES C.R.O. Block Diagram, Cathode ray tube: construction, operation, screens, Graticules, Vertical deflection system, Delay Line, Multiple trace CRO, Horizontal deflection system, Oscilloscope probe: structure of 1:1 and 10:1 probes, Measurement of frequency, time delay, phase angle and modulation index, Digital storage oscilloscope.</p>	9
SECTION-II		
4	<p>BASIC PARAMETER MEASUREMENTS D' Arsenval Galvanometer, permanent magnet moving coil (PMMC) ohmmeter, Megger ,Moving Iron Instruments, Rectifier Type Instrument, Wattmeter(basic construction),and Basic construction of Energy meter ,Digital voltmeter ,Q-meter, power meters.</p>	10
5	<p>TRANSDUCERS Classification of transducers, Unbounded strain gauge, Displacement transducers, Capacitive transducers, Inductive transducers, Linear Variable Differential Transformer (LVDT, Piezo-electric transducer, Velocity transducer, Temperature measurements, Resistance thermometer, Thermocouples and thermistors.</p>	11

Reference Books

1. W. D. Copper and A. B. Halfrick, Modern Electronics Instrumentation and Measurement Techniques, PHI Publication, 2011.
2. H. S. Kalasi, Electronics Instrumentation, 2nd Edition, Tata McGraw Hill Education, 2004.
3. K. Lal Kishore, Electronics Measurements and Instrumentation, Pearson Publication, 2010.
4. A. K. Sawhney, **Electrical and Electronic Measurements and Instrumentation**, 19th Edition, Dhanpat Rai & co., 2011

List of experiments

1. To study the use of CRO for measurement and analysis of waveforms.
2. To measure unknown resistance using whetstone bridge.
3. To measure unknown inductance using Maxwell bridge.
4. To measure unknown inductance using hay bridge.
5. To obtain and measure frequency & Phase using lissajous pattern on CRO.
6. To check the working condition of transistors and diodes using transistor tester.
7. To obtain characteristics of LVDT.
8. To study and verify characteristics of strain gauge (variable resistor transducer).
9. To obtain and verify resistance V/S temperature characteristic of RTD.
10. To test various ICs using IC tester.
11. To build a Mini project related to subject.

Course Title	ADVANCE ELECTRONICS
Course Code	DEC315
Course Credit	Lecture : 3
	Practical : 1
	Tutorial : 0
	Total : 4

Course Learning Outcomes

At the completion of the course students should be able to:

- **Characterized** Power amplifier and **demonstrate** various types of power amplifier using BJT and FET.
- **Distinguish** and **demonstrate** various power handling devices like SCR, DIAC and TRIAC.
- **Understand** the uses and requirement of regulated power supply, SMPS, UPS and stabilizer.
- **Understand** and **categorize** use of passive component to construct various oscillators using IC 555

Detailed Syllabus

Module No.	Topics	No. of Sessions
SECTION I		
1	FIELD EFFECT TRANSISTOR Field Effect Transistor: Construction, Operation, Characteristics and Parameters, FET amplifiers: Common source, Common drain, Common gate. Metal oxide semiconductor field effect transistor: N-Channel and P-channel Depletion type MOSFET. N-Channel and P-channel Enhancement MOSFET. Comparison of Bipolar Junction transistor and FET, FET and MOSFET, IGBT: Construction, characteristics and application, Comparison of IGBT and MOSFET.	8
2	SMALL SIGNAL AND GENERAL PURPOSE AMPLIFIER Low Frequency response of BJT Amplifier, Low Frequency Response of RC-Coupled Amplifier. Low Frequency Response of FET Amplifier, High Frequency Response of BJT Amplifier. High Frequency Response of FET Amplifier. Feedback Concept, Types of Feedback Connections, Gain with Feedback, Input Impedance with Feedback, Output Impedance With Feedback. Reduction in Distortion and Noise with Negative Feedback. Effect of Negative Feedback on Gain and Bandwidth.	8

3	<p>LARGE SIGNAL AND POWER AMPLIFIER Classification of power amplifier, Class A, B, AB and C Operation, Amplifier Efficiency. Class A Power Amplifier (biasing, operation, power, efficiency), Transformer Coupled Class A Amplifier. Class B Amplifier operation. (Push pull, Complimentary Symmetry), Class B Amplifier Circuits.</p>	5
SECTION-II		
4	<p>OSCILLATOR Oscillator Operation ,RC-phase Shift Oscillator (using FET, BJT and Op-Amp).,Wien bridge Oscillator, Tuned Collector, Tuned Base, Hartley and Colpitts Oscillators, Crystal Oscillators: characteristics, series and parallel resonant ,Oscillators, oscillator using IC 555 ,Negative Resistance (Uni junction) Oscillators.</p>	6
5	<p>REGULATED POWER SUPPLY Simple series voltage regulators with over current and over voltage protection Shunt regulator using transistor. SMPS (Switch mode power supply), Three terminal voltage regulators like 7805, 7812, 7905 & 7912. Basic working principle and advantage of stabilizer & uninterrupted power supply (UPS).SMPS without transformer.</p>	8
6	<p>POWER HANDLING DEVICES Introduction to power electronics, Silicon controlled rectifier(SCR),V-I characteristics of SCR, Uses of SCR in Different circuits packages,TRIAC,DIAC,fan regulators, Unijunction transistor, characteristics and application of UJT,Testing of SCR and TRIAC.</p>	7

Reference Books

1. Albert Malvino & David Bates, Electronic Principles, 7th ed., Tata McGraw Hill, 2007.
2. Robert Boylestad & Louis Nashelsky, Electronic Devices and Circuits, 10th ed., Prentice Hall of India, 2009.
3. J. B. Gupta, Electronic Devices & Circuits, 5th ed., S. K. Kataria & Sons, 2012.

List of Experiments

1. To analyze Astable Multivibrator using IC555.
2. To analyze & demonstrate Bi-stable Multivibrator using IC555.
3. To design & demonstrate Monostable Multivibrator using IC555.
4. To analyze Schmitt trigger.
5. To prepare the V-I characteristics curve for Uni-Junction transistor (UJT).
6. To prepare the V-I characteristics curve of TRIAC.
7. To prepare V-I characteristics curve of SCR
8. To design, demonstrate and analyze the frequency response of class-B push-pull amp.
- 9 To analyze the O/P characteristic n-channel JFET.
- 10 To design & demonstrate variable voltage regulator.

Course Title	BASIC ENGINEERING DRAWING
Course Code	DME205
Course Credit	Lecture : 2
	Practical : 2
	Tutorial : 0
	Total : 4
Course Objective	
<p>At the end of course, students will be able to:</p> <ul style="list-style-type: none"> • Understand the engineering drawings symbols. • Draw the various types of engineering curves, projection of lines and projection of points. • Analyze the data given and represent it in form of various Pie & Bar charts. • Interpret different types of drawings used in industry. 	
Detailed Syllabus	

Module No.	Topics	No. of Sessions
Section – A		
1	USES OF DRAWING AIDS: Drawing equipment instruments and materials. Construction of Polygons.	1
2	LINES, LETTERING & DIMENSIONING: Different types of lines. Vertical capital & lower case letters. Inclined capital & lower case letters. Numerals & Greek alphabets. Dimensioning methods – aligned method & unilateral with chain, parallel, progressive.	1
3	ENGINEERING CURVES : Various types of curves like Ellipse, parabola, hyperbola, cycloid, epicycloids, Hypocycloid, Involute & spiral.	6
4	ORTHOGRAPHIC PROJECTIONS : Front view, Top view, Side view, Bottom view, Rear view	6
SECTION B		

5	<p>PROJECTIONS OF POINTS, LINES & PLANES : Reference planes, orthographic projections. 1st Angle and 3rd Angle Projections of points. Projections of Lines–determination of true lengths & inclinations. Projections of plane–determination of true shape..</p>	6
6	<p>FASTENERS : Detachable & permanent fasteners–difference. Sketches of elements of screw threads, Sketches of thread forms–B.S, B.A, Square with worth, Acme with Knuckle, Buttress, Seller Unified, Internal & external threads, Left hand & right hand threads, Single & multi start threads. Lead & pitch. Sketches of studs, cap screws machine screws, set screws, Locking, Devices, bolts, hexagonal & square nuts & nut bolt & washer assembly. Sketches of plain spring lock, toothed lock, washers, cap nut, check nut, slotted nut, cassette\ nut, sawn nut, wing nut, eye blot, tee bolt & Foundation bolt. Sketches of various types of rivet heads (snap–pan–conical–countersunk). Sketches of keys (sunk, flat, saddle, gib head, woodruff). Sketches of hole & shaft Assembly.</p>	4
7	<p>GRAPHS & CHARTS : Advantages–types (Bar, Pie, Percentage bar, Logarithmic) Preparation & interpretation of the graphs and charts.</p>	4

Reference Books:

1. Engineering Drawing by P. J. Shah, S.Chand Publication.
2. Engineering Drawing by N. D. Bhatt, Charottar publication.
3. Engineering Graphics by Arunoday Kumar, Tech – MAX Publication, Pune.
4. Engineering Drawing & Graphics using Auto CAD 2000 by T. Jeyapoovan, Vikas Publishing.
5. A Textbook of Engineering Drawing by P.S.Gill, S.K.Kataria& Sons, Delhi.
6. Engineering Drawing with an Introduction to Auto CAD by D.A.Jolhe, Tata McGraw-Hill Publishing.
7. A Textbook of Engineering Drawing by R.K.Dhawan, S.Chand& Company Ltd., New Delhi

List of Exercises:

1. To draw Practice sheet.
2. To draw a sheet on Engineering Curves.
3. To draw a sheet on Orthographic Projection.
4. To draw a sheet on Projection of Point and Line.
5. To draw a sheet on Free hand Sketch.
6. To draw a sheet on Graph and charts.

Course Title	ELECTRICAL POWER SYSTEM-1
Course Code	DEE410
Course Credit	Lecture : 3
	Practical : 1
	Tutorial : 0
	Total : 4

Course Learning Outcomes

At the end of course, students will be able to:

- **State** the functions of the major equipment and auxiliaries of a TPS
- **Differentiate** various types of transmission and distribution systems
- **State** the features of HVDC transmission.
- **Classify** the different types of HPS.
- **Identify** the appropriate site for a NPS

Detailed Syllabus

SECTION I

Module No.	Topics	No. of Sessions
1	GENERATION OF ELECTRICAL POWER Principle of energy conversion in different power stations, Layout / line diagram / flow diagram / accessories used and their Working in following power stations. a. Thermal Power Station b. Hydro Power Station c. Nuclear Power Station d. Diesel Power Station Load curves and load duration curves, base load and peak load power plants. Preparation and maintenance of technical reports pertaining to power station Operation. Name of major power plant in Gujarat	14
2	TRANSMISSION OF ELECTRICAL POWER The features of different transmission system, need for Overhead line supports and insulators , Design of overhead transmission line with equal supports ,Effect of voltage on transmission efficiency, line regulation and	14

	<p>volume of conductor materials and selection of economical transmission voltage , Interpret and explain Sag calculations. Differentiate Performance of short and medium transmission lines (T and method) Layout of control room and its equipment at power station. Layout and equipment of switchyard at power station. Describe the importance and function of the load dispatch center, importance of PLCC in power transmission.</p>	
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SECTION II

3	<p>CONTROL OF POWER STATION The importance of Voltage control method, Types of Voltage control method , Speed governor system.</p>	5
4	<p>HVDC TRANSMISSION Need for EHV Transmission, Feature of HVAC. Transmission. Types of HVDC Transmission, Comparison HVDC and HVAC system. Advantages of HVDC system</p>	8
5	<p>NON-CONVENTIONAL POWER GENERATION 5.1 Concept and working principle of, (a) MHD generation (b) Solar energy (c) Wind energy</p>	8

Reference Books:

1. V.K. Mehta, "Electrical power system" Publication S. Chand & Co., New Delhi, 2011.
2. S.L.Uppal, "Electrical power" Khanna Publishers, New Delhi, 2011.
3. Solanki, Chetan S, "Solar PV Lab Manual" PHI Learning, New Delhi, 2013.
4. B.R.Gupta, "power system analysis and design" S. Chand & Co., New Delhi, 2010.

List of Experiments:

1. Interpret the line diagram of Thermal Power Station (T.P.S.) and Main cycles & explains working of T. P. S.
2. Prepare technical report of visit to a nearby H.P.S.
3. Prepare a report on Hydro power stations in Gujarat by collecting data from Internet.(otherwise from Internet)
4. Interpret the schematic diagram of Nuclear power station & explain the function of each component.
5. Draw and Interpret schematic diagram of a Diesel Power Station.
6. Draw and Interpret schematic diagram of a MHD Power Station.
7. Collect the data from nearest power station for load curve Preparation and interpret it.
8. Interpret and explain insulator and pole tower structure
9. Interpret the calculation on sag.
10. Interpret and explain the voltage control of power station.
11. Prepare a report after visiting nearby substation with its layout.
12. Prepare technical report of visit to a nearby Solar PV station.(otherwise from Internet)
13. Prepare Technical Report after visit to the Load Dispatch Centre.(otherwise from Internet)
Prepare technical report of visit to a nearby Wind energy.(otherwise from Internet)